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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI

October 10th, 2006

File: 2AM-JER0410/D5 and H1
By Fax: 1-416-777-1898

Greg Missal
Vice-President Nunavut Affairs
Tahera Diamond Corporation
130 Adelaide Street West, Suite 1900
Toronto, Ontario M5H 3P5

Subject: NWB review of submitted TDC responses to Processed Kimberlite Management Plan and intervener comments

Dear Mr. Missal:

The Nunavut Water Board (NWB) requests further clarity on issues related to the Jericho Diamond Mine Processed Kimberlite Management Plan (**Part D, Item 5, Part H, Item 1**). The following documents were consulted in reviewing the Processed Kimberlite Management Plan (PKMP):

- i. **Processed Kimberlite Management Plan –Tahera Diamond Corporation - Jericho Project** *Processed Kimberlite Management Plan 1100060.004* (received: March 10th, 2006)
- ii. **Environment Canada Intervention Statement – NWB1JER0410 - Tahera Diamond Corporation, Jericho Diamond Mine – Submission of Processed Kimberlite Management Plan** (received: April 24th, 2006)

After a review of the above listed correspondence it has been determined that additional information and clarity is needed. The NWB requests additional information regarding the following listed items. Where appropriate, the NWB has arranged the comments according to items (a) to (i) specified in **Schedule D, Item 5** and items (a) to (e) specified in **Schedule H, Item 1**, of the water licence **2AM-JER0410** (formerly NWB1JER0410).

(Part D, Item 5)

The Licensee shall submit to the Board for approval, a detailed Design Plan at least sixty (60) days prior to the construction of the Processed Kimberlite Containment Area including drawings, stamped by a Geotechnical Engineer and/or Engineering Geologist. This plan shall be developed in accordance with Schedule D, Item 5.

(Schedule D.5)

The detailed design report for the PKCA referred to in Part D, Item 5 of the Licence, shall include but not necessarily limited to the following:

- a. *Detailed construction implementation schedule for the PKCA infrastructure;*
- b. *Consideration of industry standard “Dam Safety Guidelines” (Canadian Dam Association, 1999)*

- c. *Key design and performance parameters for PKCA components including, the spillway, West Dam, North Dam, Perimeter Dykes, East Dam, Southeast Dam, and the Divider Dyke.*
- d. *Contingency components (i.e. the North Dam) can be submitted as part of this detailed design or may require separate submission of detailed design.*
- e. *The PKCA shall be designed and constructed to prevent discharge to the groundwater system.*
- f. *There shall be no accumulation of water against the containment dam structures of the PKCA until such time as the results of the thermal monitoring program has demonstrated the integrity of all frozen core dams;*
- g. *Representative cross sections showing the various stages of dam raises when geothermal modeling and short term slope stability analyses are to be conducted;*
- h. *The results of revised geothermal modeling throughout the intermediate and final stages of construction; and*
- i. *Additional site assessments: delineation including of ice-rich features; follow-up test pit and/or bore hole investigations data; and geophysical surveys.*

(Part H.1)

The Licensee shall, at least four (4) months prior to the first effluent discharge from the PKCA, submit to the Board for approval, the PKCA Management Plan. The final detailed report shall be stamped by an Engineer. This report shall be developed in accordance with Schedule H, Item 1.

(Schedule H.1)

The PKCA Management Plan referred in Part H, Item 1 of the Licence, shall include but not necessarily limited to the following:

- a. *Consider operational guidelines provided in "A Guide to the Management of Tailings Facilities (Mining Association of Canada, 1998)" and the "Dam Safety Guidelines (CDA, 1999)"*
- b. *The use flocculant in the treatment process and controls for its use;*
- c. *Detail how effluent discharge rates will be managed to ensure a minimum 10:1 dilution at the edge of the mixing zone in Lake C3. This plan shall not rely on estimating receiving environment outflow rates from changes in Carat Lake level unless monitoring data is provided that shows that the procedure will work as a means of calibrating effluent discharge rates.*
- d. *Stage-volume curves and water, solids and ice balance calculations showing life expectancy of the PKCA Facility; and*
- e. *Any operational and/or structural modifications which may be implemented that will affect the management of the PKCA Facility and associate wastewater operations.*

1. **(Schedule D, Item 5(c))** TDC provided a construction implementation schedule for various PKCA containment structures within **Section 5.0, Table 10** (page 18). Select structures are slated to begin construction after operation of the PKCA. What performance and operation characteristics will be used to benchmark when remaining water control or containment structures are to be constructed? The Board requests TDC to provide detailed discussion and description to address this issue.
2. **(Schedule D, Item 5(d))** Numerous water control and containment structures are schedule to be constructed in the near future. How and when does TDC intend to file detailed final designs and accompanying construction records for the additional water control and containment structures outlined in the report? The PKCA report stated that the North Dam is planned to be constructed in the fall of 2006 (**Section 5.5 – North Dam**; page 21). Has any construction of the North Dam occurred? The NWB requests an update in when work scheduled for the North Dam is to take place and how information related to the design of the North Dam will be communicated to the NWB.

3. **(Schedule D, Item 5(e))** TDC provided no discussion or details pertaining to the potential for discharge to the groundwater system from the PKCA. The Board requests additional discussion and detail to fulfill this licence requirement.
4. **(Schedule D, Item 5(f))** TDC provided no discussion or detail on how to limit the accumulation of water against the containment dam structures of the PKCA until such time that the thermal monitoring program has demonstrated the integrity of all frozen core dams. This information has also not been provided in the design or construction specification reports for the west dam, divider dyke, or east and southeast dam. What criteria were employed to determine the integrity of the frozen core dams? Was the integrity of the frozen core dams ensured before accumulation of water against the dam structures? How will this information be communicated to the Board? The Board request additional discussion and detail to address this to fulfill this licence requirement.
5. **(Schedule D, Item 5 (g))** The Board requests additional detail or direction to the appropriate reference document and section where this provision has been satisfied.
6. **(Schedule D, Item 5(h))** The Board requests additional detail or direction to the appropriate reference document and section where this provision has been satisfied.
7. **(Schedule H, Item 1 (b))**
(Section 3.4 – Flocculants and Coagulants)
Two different polymers have been specified to be used as a flocculant and coagulant. The MSDS has been provided in the PKMP document. Will these polymers have a negative impact on receiving water bodies at the anticipated loading rates? If TDC believes this information has been submitted in another document, the NWB invites TDC to appropriately reference the referenced document and the appropriate section within the referenced document where the information can be found to address concerns.
8. **(Schedule H, Item 1 (c))**
 - a. **(Section 4.3.3 – Dilution Ratio in Lake C3)** The NWB understands that Tahera is using the PKCA as a disposal location for runoff from surrounding sumps, waste rock piles, tailings, treated sewage, etc. Controlled release of fluid from the PKCA will take place at the West Dam location to obtain a minimum 10:1 dilution at the edge of the mixing zone in Lake C3.

Final results of a water balance were provided which may have included the volume loadings into the PKCA in the analysis; however, the volumes discharged from each respective source was not provided and may be contained in a separate report (the NWB requests TDC to the appropriate reference the document and section where this information can be obtained if disclosed in a separate report). What are the volumes and concentration of constituents within the fluid, which discharge to the PKCA from each respective source?

The mass loadings of critical water quality constituents entering and discharging the PKCA were not provided. What water quality parameter(s) have been identified as critical parameters to obtain a minimum 10:1 dilution at the edge of the mixing zone in Lake C3 and what is the source of these constituents?

What operational changes within the PKCA (i.e., construction of berms, placement of tailings in different locations/cells, temporal loadings, etc.) are expected to impact quality of discharging water from the PKCA?

TDC stated that the discharging volume of fluid from the PKCA was less than the values deduced in the water quality report completed by SRK (2004a). Was the water quality at the

discharge location of the West Dam in the SRK (2004a) report representative of the PKCA operation over the life of the facility?

The Board requests additional detail and discussion to address the issues provided in the above discussion. If TDC believes this information has been submitted in another document, the NWB invites TDC to appropriately reference the referenced document and the appropriate section within the referenced document where the information can be found to address concerns.

- b. **(Section 4.3.3 – Dilution Ratio in Lake C3)** Discharge of fluid from the PKCA is to occur during the summer months at specified rates as determined to be less than that provided in the SRK (2004a) water quality report to achieve a minimum dilution of 10:1. Are there select water quality constituents measured at the PKCA discharge location that will be used as a marker in a set criterion to achieve the minimum 10:1 dilution? For example, will the concentration of select constituent be required to be lower than a predefined value before discharge from the west dam is permitted? If so, what are they and what are the details of this criterion. If not, will discharge of water be solely based on the results of the SRK (2004a) report? How representative are the SRK (2004a) assumptions in the analysis to the operation of the PKCA? The Board requests additional detail and discussion to address these issues.
- 9. **(Schedule H, Item 1 (e))**
 - a. **(Section 3- Fine PK Disposal Management)** The characteristics (e.g., pipe size, flow rate, water quality, layout on site, etc.) and locations for spigots to dispose of tailings, discharge pipe to dispose of treated sewage water in the PKCA, and reclaim water line from the PKCA to the processing area from the PKCA are not provided in the PKCM report. Details of the location of these piping infrastructures are not provided in the drawings. If this information is provided in other documents, appropriate referencing which includes report title, section, and page number should be provided. If provided elsewhere, the Board requests a summary of key details to be included in the PKCM. The Board requests additional discussion on this issue.
 - b. **(Section 4.2.4 – Seepage through Divider Dykes A and B)** TDC assumed that “standing water elevation in Cell A will be controlled such that it will be below elevation, 523 m”. This will be done by implementing an overflow system in Dyke A. However, Figure 8 depicts Cell A standing water perched above the tailings surface during the summer months. Will standing water be controlled during the winter months to limit ice occupying storage volume within the cell? Will standing water only be controlled by surface contouring or will there be additional means? If so, what are they? In addition to Dyke A, will Dyke B require an overflow system? What criteria will be used to benchmark if an overflow system for the dykes is required? These details have not been provided in the Divider Dyke A design report. Has an overflow system been considered in the analysis for assessing water and tailings volumes/elevations? If so, what characteristics of the overflow system were assumed? The Board request additional detail and description to address these issues.
 - c. **(Section 5.4.2 – Perimeter Berm Design)** TDC stated that seepage will be collected on the downstream side of the berm if necessary. Why was the construction of a berm (therefore applied load) on the Divider Dyke A, East dam, and Southeast dam not considered in the stability analysis in the Divider Dyke A or East and Southeast design report? Why are there inconsistencies in the final design of these structures between the respective design reports submitted to the NWB? Will the stability of the dykes and dams be impacted by the construction of the perimeter berm and additional tailings and water loadings on the upstream face compared to that reported in the respective design reports? If so, how much? If not, why not? The Board requests additional detail and discussion to address this issue.

- d. **(Section 5.6 - Settling Pond Dam)** TDC stated that an additional settling pond may be constructed downstream of the West Dam if additional suspended solids removal in the supernatant is required. The Board requests additional detail and discussion on the evaluation criteria (including quantifiable markers) that will be used to benchmark if a settling pond is required.

Further to the comments listed above, the Board requests clarity on the following points:

10. **(Section 6.2 - Volume Occupation)** TDC stated that fine PK will be sampled to determine if fines segregation is occurring to partner sampling for in-situ density and ice contents; however, there is no specification on density to be achieved. The Board requests additional detail to address this issue and how these fine PK properties will be measured, frequency of measurement (spatially and temporally), and the proposed mechanism TDC plans to report these results.
11. **(Section 7.0 – Adaptive Management)** TDC stated that dilution ratio for discharging fluid in Lake C3 will be calculated to determine performance of the system and that discharge rates may be adjusted to optimize the water quality. What criteria will be used to “optimize” discharge rates? How will this information be communicated to the Board?
12. **(Section 7.0 – Adaptive Management)** TDC stated that placement of fine PK will be managed to reduce the amount of ice entrained within the fine PK. It was proposed that one method to achieve this was to dispose of fine PK under water; however, **Section 4.2.4** stated that standing water will be limited within the PKCA. The Board requests additional detail and discussion on how this will be conducted and clarity on these inconsistencies.
13. The NWB requests all design drawings relevant to the PKCA be signed, stamped, and submitted to the Board.
14. The NWB would like to reiterate an issue reported in a letter sent August 3rd, 2006 on matters related to Part H, Item 1. On June 26th, 2006 the NWB received a letter TDC Re: Notification of intent to discharge from the Processed Kimberlite Containment Area (PKCA) to Stream C3. As per condition H1 Tahera was to submit the PKCA Management Plan four (4) month prior to the first effluent discharge from the PKCA. The NWB would like to remind TDC that the PKCA Management Plan referred to in Part H, Item 1 has not been approved by the Board and was received by the NWB on March 10th, 2006. July 10th, 2006 marks the date four months following the date the submission was received. TDC is to report to the NWB when this first discharge took place.

In summary the Board requests a formal response to each of the above stated provisions. Sufficient detail and an avoidance of ambiguity should be followed in submitting response materials to the listed provisions. If you require assistance whatsoever please feel free to contact Dr. Jamie Van Gulck, P.Eng. at (204) 792-4129 or van gulck@vgqconsulting.com.

Sincerely,

Original signed by:

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Director Technical Services

cc. Carl McLean (INAC)
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